

CLAIMS

1. A method of monitoring at least one feature of a blast, the method comprising the steps of:
 - 5 - providing at least one detonator at a blast site to cause at least part of the blast;
 - prior to the blast, utilizing a blast control signal path extending between a blast controller and the at least one detonator, to communicate blast control signals to the at
10 least one detonator;
 - during a period following start of the blast, utilizing a blast feature signal communication path comprising at least part of the blast control signal path to communicate a blast feature signal relating to at least one feature of the blast to
15 a blast feature monitoring station.
2. A method as claimed in claim 1 wherein a plurality of detonators are provided in spaced relation at the blast site and wherein each detonator is associated with a respective blast control signal path
20 and a blast feature signal communication path.

3. A method as claimed in claim 1 wherein the feature is velocity of detonation (VOD) of a main charge initiated by the detonator.
4. A method as claimed in any one of claims 1 to 3 wherein the
5 blast controller and the blast feature monitoring station are
provided at a common location which is remote from the blast
site.
5. A method as claimed in any one of claims 2 to 4 wherein the
10 respective blast control signal paths comprise respective
conductor arrangements connected to each of said detonators.
6. A method as claimed in claim 5 wherein the respective conductor
arrangements branch from a main conductor arrangement
15 connected to the blast controller.
7. A method as claimed in claim 6 wherein the blast feature signal is
generated by at least one sensor which is connected to one of the
main conductor arrangement and any of the respective conductor
20 arrangements.

8. A method as claimed in claim 7 wherein at least one sensor is located outside of any detonator housing.
- 5 9. A method as claimed in any one of claims 6 to 8 wherein the blast feature signal communication path comprises at least part of the main conductor arrangement.
- 10 10. A method as claimed in any one of claims 7 and 8 wherein the blast feature signal communication path comprises at least part of the respective conductor arrangements to which the at least one sensor is connected, and a wireless link.
- 15 11. A method as claimed in any one of claims 5 to 10 comprising the steps of generating a monitoring signal in a respective conductor arrangement and sensing a change in a blast feature monitoring parameter of the signal as a result of the blast, to generate the blast feature signal.
- 20 12. A method as claimed in claim 11 wherein the monitoring signal comprises a first signal and a second signal, and wherein the blast feature monitoring parameter relates to a difference in

corresponding signal parameters of the first signal and the second signal.

13. A method as claimed in claim 12 wherein the first signal is
5 generated by a signal generator located at a remote blast controller and which is connected to the respective conductor arrangement by a main conductor arrangement and which is also connected to the blast feature monitoring station.

10 14. A method as claimed in claim 12 wherein the first signal is generated in the respective conductor arrangement by a signal generator located at the remote blast controller and wherein data relating to the change is transmitted from a sensor connected to the respective conductor arrangement via a wireless link to the
15 blast feature monitoring station.

15. A method as claimed in claim 12 wherein the first signal is generated by a signal generator connected directly to the respective conductor arrangement and data relating to the change
20 is transmitted by a sensor connected to the respective conductor arrangement via a wireless link to the remote blast feature monitoring station.

16. A method of monitoring a feature of a blast, the method comprising the steps of:
- providing a conductor arrangement connected to a detonator and which detonator causes part of the blast;
 - 5 - generating a monitoring signal in the conductor arrangement;
 - sensing a change in a blast feature monitoring parameter of the signal as a result of the blast; and
 - processing data relating to the change for providing data
10 relating to the feature.
17. A method as claimed in claim 16 wherein the feature is velocity of detonation (VOD) of a main charge initiated by the detonator.
- 15 18. A method as claimed in claim 16 or claim 17 wherein the conductor arrangement is connected to the detonator to control the detonator.
19. A method as claimed in any one of claims 16 to 18 wherein the
20 conductor arrangement comprises a pair of twisted conductors.

20. A method as claimed in any of claims 16 to 19 wherein the monitoring signal comprises a first signal and a derivative signal of the first signal.
- 5 21. A method as claimed in claim 20 wherein the blast feature monitoring parameter relates to a differences between corresponding signal parameters of the first signal and the derivative signal.
- 10 22. A method as claimed in claim 21 comprising the steps of causing a signal generator to generate the first signal for propagation on the conductor arrangement, generating a derivative signal by causing a reflection of the first signal, and monitoring changes in the difference in corresponding signal parameters of the first
15 signal and the reflection.
23. A method as claimed in any one of claims 20 to 22 wherein the first signal is generated by a signal generator at a remote blast controller which is connected to said conductor arrangement by a
20 main conductor arrangement and which is also connected to a blast feature monitoring station.

24. A method as claimed in claim 22 wherein the first signal is generated by a signal generator at a remote blast controller and wherein data relating to the changes is transmitted from a sensor connected to the conductor arrangement via a wireless link to a remote blast feature monitoring station.

25. A method as claimed in claim 22 wherein the first signal is generated by a signal generator connected directly to the conductor arrangement and wherein data relating to the changes is transmitted by a sensor connected to the conductor arrangement via a wireless link to a remote blast feature monitoring station.

26. A system for monitoring at least one feature of a blast comprises:

- at least one detonator located at a blast site to cause at least part of the blast;
- a blast control signal path extending between a blast controller and the at least one detonator, to communicate blast control signals to the at least one detonator;
- a sensor sensitive to a feature of the blast; and
- a blast feature signal communication path comprising at least part of the blast control signal path, to transmit a

blast feature signal relating to the feature of the blast to a remote blast feature monitoring station.

27. A system as claimed in claim 26 wherein the sensor is located
5 outside of a housing of at least one detonator.

28. A system as claimed in claim 27 wherein the sensor comprises a
device connected to a conductor arrangement which is connected
to the detonator.

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29. A system as claimed in claim 27 wherein the sensor comprises at
least part of a conductor arrangement connected to the detonator.

30. A system for monitoring a feature of a blast, the system
15 comprising:

- a detonator for causing at least part of the blast;
- a conductor arrangement connected to the detonator for
controlling operation of the detonator;
- a monitoring signal generator arranged to generate a
20 monitoring signal in the conductor arrangement; and
- a sensor for sensing changes in a blast feature monitoring
parameter of the monitoring signal as a result of the blast.

31. A system as claimed in claim 30 wherein the sensor is located outside of a housing of the detonator.
- 5 32. A system as claimed in claim 30 or claim 31 wherein the signal generator is connected to the conductor arrangement by a main conductor arrangement extending between the conductor arrangement and the signal generator.
- 10 33. A system as claimed in any one of claims 30 to 32 wherein the signal generator forms part of a blast controller.
34. A system as claimed in any one of claims 30 to 33 wherein the sensor comprises a sensing circuit forming part of the blast controller.
- 15 35. A system as claimed in any one of claims 30 to 33 wherein the sensor is connected directly to the conductor arrangement and wherein the data relating to the changes is transmitted from the sensor via a wireless link to a remote blast feature monitoring station.
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36. A system as claimed in claim 35 wherein the sensor is connected to the conductor arrangement at a point where the conductor arrangement branches from a main conductor arrangement.

5 37. A system as claimed in claim 30 wherein the signal generator and the sensor are connected directly to the conductor arrangement and wherein the data relating to changes in the blast feature monitoring parameter is transmitted via a wireless link from the

10 sensor to a remote blast feature monitoring station.

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